

**The California Central Coast Research Partnership:  
Building Relationships, Partnerships, and Paradigms for  
University-Industry Research Collaboration**

**FINAL REPORT**  
**ONR GRANT NO. N00014-05-1-0167**  
**December 09, 2004 to December 10, 2009**

**Principal Investigator:**

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**California Polytechnic State University**  
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<b>14. ABSTRACT</b> The primary purpose of the C3RP program is to carry out applied research and development projects and build research capacity in areas of interest to the Department of Defense and the Office of Naval Research. Specifically the award provided infrastructure (equipment and technical support) to enhance and expand research projects supported under other ONR awards to C3RP.					
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## **I. Title of Project and Principal Investigator**

The California Central Coast Research Partnership: Building Relationships, Partnerships and Paradigms for University-Industry Research Collaboration; Susan C. Opava, Ph.D.

## **II. Summary of Project**

The mission of the California Central Coast Research Partnership (C<sup>3</sup>RP) is to facilitate the exchange of technical knowledge and skills between the higher education sector and the private sector in San Luis Obispo County, and to encourage the growth of high-tech companies in the region, thereby enhancing economic development and quality of life. Since its inception, the project has focused on technologies of relevance to the Department of Defense. The partnership is a long-term plan to create a dynamic and self-supporting university-industry-government partnership that capitalizes on the strengths and mutual interests of the educational and technology-based business sectors. The plan recognizes the key role of higher education in preparing a highly skilled work force and transferring new knowledge to practical uses. The outcomes of this partnership, when fully realized, will be the creation of a robust and self-sustaining base of University R&D activities; the development of existing technology-based businesses and the creation of new ones; and the generation of opportunities for job training and research and development activities for University and Community College students and faculty.

The project also includes the construction (with non-DOD funding) of a technology park on the California Polytechnic State University campus, which will provide state-of-the-art space for private technology companies engaged in research and development activities, as well as a business incubator that will provide all of the support services needed by start-up, technology-based companies.

The aspect of the program supported by the ONR award that this final report addresses is the continued development of a strong base of applied research at Cal Poly. Specifically the award provided infrastructure (equipment and technical support) to enhance and expand research projects supported under other ONR awards to C<sup>3</sup>RP. The results of those research projects have been or will be provided in the final reports for those awards.

## **III. Relevance to ONR Objectives**

### **A. Relevant partners.**

C<sup>3</sup>RP represents a coalition of educational institutions, local, state and federal government, and private businesses that have worked together in unprecedented fashion to advance the common goals inherent in the proposed university-industry partnership. The current partners in the project and their contributions include:

#### **California Polytechnic State University**

- committed the land for the technology park project, valued at ~\$1.5 million
- provided assistance in financial management of the project



- contributed \$90,000 for a pre-feasibility study by Bechtel Corporation for the technology park project
- committed several hundred thousand dollars of in-kind contributions of senior management time and effort over several years and continues to do so
- invested ~\$1,000,000 in efforts to raise additional funds for the project; secured sufficient private and other federal funding to construct the first building in the Cal Poly Technology Park

**CENIC** (Corporation for Educational Network Initiatives in California; association of Internet2 universities in CA)

- works with Cal Poly to provide high-bandwidth internet access to support C<sup>3</sup>RP research projects

**City of San Luis Obispo**

- in partnership with Cal Poly developed a carrier-neutral fiberoptic ring around the city that benefits both Cal Poly and technology-based businesses

**Housing and Urban Development**

- provided funds toward construction of the pilot technology park building.

**Economic Development Administration**

- has provided funds toward construction of the pilot technology park building.

Efforts are ongoing to secure new partners, including:

- Major corporations
- Small technology-based businesses

**B. Relevant R&D focus.**

The research programs supported by C3RP are relevant to seven of the eight “thrust areas” of ONR’s Code 30 Science and Technology Program. The projects involve basic research in these areas, as well as applied research and development leading to more immediate technological applications. The seven areas of relevance and the more specific focus areas to which the research contributes are listed below:

**Command and Control, Computers, Communication:** situational awareness; communications; knowledge management; computational electromagnetics; autonomous systems; LIDAR; data acquisition; satellite constellations; reconnaissance; denial of service attacks.

**Force Protection:** post-impact/explosive force stability assessment; bio- and chemical-hazard detection and mitigation; risk/vulnerability assessment; new materials; collision avoidance; autonomous robots.

**Mine Countermeasures:** coastal monitoring; IED detection; situational awareness.

**Human Performance, Training and Survivability:** cognitive performance enhancement; physical performance enhancement; smart materials; sensors; biological stress reactions; biomarkers; injury repair; improved materials and processes for use on military bases and in the field.

**Intelligence, Surveillance and Reconnaissance:** data acquisition; sensors; satellite constellations; autonomous vehicles; optical and radar imaging.

**Logistics:** alternative energy sources; new materials.

**Maneuver:** advanced design and materials for vehicles (land and water).

### **C. University-industry-government partnership.**

The primary focus of this long-term initiative is to forge a strong link between private sector R&D and University applied research to speed the development of new knowledge and the transfer of technology to the public and private sectors. San Luis Obispo has become a draw for technology businesses (with a heavy concentration of software development companies) from both the LA Basin and Silicon Valley. For example, SRI (Stanford Research Institute), International operates a "software center of excellence" in the city. Lockheed-Martin has a research and development group in nearby Santa Maria. Two local companies manufactured critical components for the Mars rovers, and other companies, e.g. California Fine Wire, Aeromech, and CDM Technologies are suppliers to the military. Also located on the Central Coast are branches of two major biotechnology companies: Promega Biosciences and Santa Cruz Biotechnology.

## **IV. Summary of Results During the Period of Performance**

### **A. General.**

The award reported on here began in December 2004 and ended in December 2009. The majority of the funding was used to develop the research capacity at the University's deep-water pier in Avila Beach, CA. Minor support was also provided to the research program in industrial technology and for remodeling of space to accommodate a center for usability, design, testing and evaluation.

### **B. Development of new research capacity: specific projects supported.**

#### **1. Flowing seawater system for the Cal Poly pier.**

One of the goals of the C<sup>3</sup>RP program is to increase the capacity of the organization to carry out state-of-the-art research in the areas of interest outlined above. One of the most productive research groups in this regard is the Marine Science Group at Cal Poly. While the deep-water pier acquired as a gift from Unocal in 2001 is a unique resource for oceanographic and marine



biological research, it was not a research-capable facility when acquired by the University. In partnership with the University, and with matching funds from other sources such as the National Science Foundation, the C<sup>3</sup>RP program upgraded the research capacity at the pier through the installation of a flowing sea-water system.

The upgrade developed a seawater-pumping system to elevate water from the Avila Bay to the Pier deck. The system includes an intake system with pumps, a filtering system and finally a distribution network with seawater tanks for marine life observation, experimentation and development. The structural parts included a new concrete slab to lay out filters and water tanks (and to protect the pier steel structure from salted water runoffs) and a simplified building structure above deck to house and protect the equipment and tanks from direct sun and UV exposure. Some funding was also directed toward continued maintenance of the system during the award period. Responsibility for continued maintenance has been assumed by the University. Technical-support personnel were also partially funded to provide assistance to research projects. The pier is pictured below showing structures that support the new seawater system, research laboratories, and classrooms.



**Cal Poly Pier at Avila Beach and the Cal Poly Center for Coastal Marine Science (CCMS).**

The Cal Poly Pier today is used by students and faculty of Cal Poly for marine science research. Much of this research is supported by ONR, both through funding to C<sup>3</sup>RP and through other grants and contracts from ONR and other State and Federal agencies. The sea-water system has expanded the research opportunities at the pier and enabled the researchers to undertake more projects of interest to ONR. It has also allowed them to leverage this investment to obtain funding from other sponsors, in addition to ONR. A list of the C<sup>3</sup>RP-supported projects undertaken by researchers in the Marine Science Group follows. A list of all relevant grants and contracts awarded to these researchers since January 1, 2005 is attached.

**C<sup>3</sup>RP -supported research projects undertaken by researchers in the Marine Science Group:**

**Adams, Nikki**

Biological Sciences

*Molecular sensors and defenses against ultraviolet radiation*

**Bensky, Tom**  
Physics

*High resolution laser-based sea-floor monitoring at Avila Bay*  
*Real-time underwater optical sensing of seawater at Avila Bay*

**Clark, Christopher**  
Computer Science  
*Multi-AUV path optimization for improved ocean model forecasting*

**Griffith, Elizabeth**  
Physics  
*Measuring ocean surface velocity and improving estimates of coastal surface currents in San Luis Bay, with application to other bays and coastlines*

**Moline, Mark A**  
Biological Sciences  
*Access to the Central Coast's marine environment through a real-time/archived data interface*

**Rosenberg, Lou; Moline, Mark**  
Mechanical Engineering  
*Enhanced operator control of remotely operated vehicles*

**Tomanek, Lars**  
Biological Sciences  
*Environmental proteomics: The minimal stress proteome in the marine model organisms Ciona intestinalis and C. savignyi - networks of co-expressed proteins*  
*Environmental Proteomics: A new approach to tracking environmental change in marine organisms*

**Wendt, Dean**  
Biological Sciences  
*Establishment of a field site for testing non-toxic, fouling-release marine coatings to aid in the control of biofouling.*

**Related grant and contract awards to researchers in the Marine Science Group (1/1/05-3/3/10) (see Attachment 1).**

## **2. Equipment to support research in packaging and polymers**

The packaging laboratory in the Industrial Technology department at Cal Poly has been supported through the C<sup>3</sup>RP program and is part of the Radio Frequency Identification (RFID) research initiative led by PolyGAIT, the University's center for research on Global Automatic Identification Technologies. The laboratory's state-of-the-art research in packaging (durability, biodegradability, smart materials, electronic tracking, etc.) addresses the important military area of logistics and the transport of materials, mitigation of the cost of waste disposal related to these materials, and protection of foods and medicines that are provided to military personnel around



the globe. A particular strength of the packaging laboratory is the use of novel polymers in various applications, even beyond packaging. One C<sup>3</sup>RP-supported project has resulted in the development of a new design for a polymer-based oral airway device. A non-provisional patent application has been filed with the USPTO and a continuation-in-part of that application is anticipated. Funding under this award was utilized to further develop the research capability of the packaging group by investing in a compression test unit and extruder as summarized below.

- Compression tester. This device measures compression effects from stacking packaged items during warehousing and transshipment.
- Extruder for plastic resin applications. This extruding device enables sheet and film casting of both petrochemical and biodegradable starch-based polymers.

A list of the C<sup>3</sup>RP-supported projects undertaken by researchers in the packaging group follows. A list of all relevant grants and contracts awarded to these researchers since January 1, 2005 is attached.

**C<sup>3</sup>RP-supported research projects undertaken by researchers in the packaging group:**

**Vorst, Keith**

Industrial Technology

*Development of an emergency oral airway device*

*Adaptation of the Bardo Airway to the Intraoral Mask: Innovative airway management devices working in concert*

**Related grant and contract awards to researchers in the packaging group (1/1/05-3/3/10)  
(see Attachment 2).**

**3. Center for Usability, Design, Testing, and Evaluation**

Partial support was provided for the remodeling of space in the Orfalea College of Business to serve as a center for usability, design, testing and evaluation of products. The center provides the capacity to do advanced development of products that emerge from campus research, by providing essential data on usability and performance. The center also serves the important role of training students in the product-development process and supports cross-collaboration among faculty and students in technical disciplines and those in business disciplines, which can accelerate the transfer of research results to the public. The center is available to all C<sup>3</sup>RP researchers to assist them in development and improvement of products ranging from software to new technical devices.

## ATTACHEMENT 1

## Grants Development Office

California Polytechnic State University, San Luis Obispo

<http://www.calpoly.edu/~grants>

## Grant and Contract Activity from 1/1/05 to 3/3/10 for Marine Science Group Pls

FACULTY PI CO-PI	TITLE SPONSOR AWARD #	PROJECT DATES	AMOUNT
<b>NIKKI ADAMS</b>			
Adams, Nikki	RUI: Molecular Effects of Ultraviolet Radiation on the Cell Cycle and Development of Sea Urchins NATIONAL SCIENCE FOUNDATION (RUI)		
Personnel:	Lab Technician TBD		
	04-144	08/01/04 - 07/31/09	\$376,678
Adams, Nikki	Mass spectroscopy analysis of effects of ultraviolet radiation on the proteome of sea urchin embryos CSUPERB: CSU FACULTY-STUDENT COLLABORATIVE RESEARCH SEED GRANT PROGRAM		
	07-091	06/01/07 - 05/31/08	\$13,500
Adams, Nikki	Molecular Effects of Ultraviolet Radiation on the Cell Cycle and Development of Sea Urchins NATIONAL SCIENCE FOUNDATION (REU)		
	07-250	06/01/07 - 07/31/08	\$6,000
			<b><u>Adams Award Total: \$396,178</u></b>
<b>CHRISTOPHER CLARK</b>			
Clark, Christopher	Ice-edge AUV mapping and navigation experiments in the arctic NATIONAL SCIENCE FOUNDATION		
Moline, Mark	Co-PI: Moline, Mark		
Personnel:	09-299	09/01/09 - 08/31/10	\$19,963
Noori, Mohammad	REU SITE-SUMMER INTERNSHIPS IN ROBOTICS AND AUTONOMOUS SYSTEMS NATIONAL SCIENCE FOUNDATION		
Bekey, George	Co-PI: Bekey,	Bill Durgin John Seng Christopher Clark (Co-I)	Saeed Niku
Personnel:	08-077	03/01/08 - 02/28/11	\$297,081
			<b><u>Clark Award Total: \$317,044</u></b>
<b>MARK MOLINE</b>			
Moline, Mark	Collaborative Research: Lagrangian studies of the transport, transformation, and biological impact of nutrients and contaminant metals in an estuarine plume. NATIONAL SCIENCE FOUNDATION		
Personnel:	Research Associate		
	02-263	03/01/03 - 02/28/07	\$219,505
Moline, Mark	Quantification of Littoral Bioluminescence Structure and Induced Water Leaving Radiance U.S. DEPT OF THE NAVY, OFFICE OF NAVAL RESEARCH		
Personnel:	Technician		
	03-022	01/01/03 - 12/31/05	\$248,989

## ATTACHEMENT 1

FACULTY PI CO-PI	TITLE SPONSOR AWARD #	PROJECT DATES	AMOUNT
<b>MARK MOLINE</b>			
Moline, Mark	SCCOOS: Shelf to Shoreline Observatory Development NOAA VIA SCRIPPS INSTITUTION OF OCEANOGRAPHY		
Personnel:	Research Fellow Shelley Blackwell		
	04-087	06/01/04 - 12/31/07	\$203,505
Moline, Mark	Yr 3: Validation of Hyperspectral Remote Sensing along the Central California Coast and Development of a Coastal Marine Information System NOAA VIA SJSU FOUNDATION MOSS LANDING MARINE LABORATORIES		
	04-134	08/01/04 - 07/31/06	\$381,033
Moline, Mark	ITR: COLLABORATIVE RESEARCH: (ASE)-(DMC+INT+SIM): Designing the Next Generation CI to Operate Interactive Ocean Observatories NATIONAL SCIENCE FOUNDATION VIA UNIVERSITY OF CALIFORNIA, SAN DIEGO		
	04-180	10/01/04 - 09/30/05	\$150,000
Moline, Mark	The Southern California Coastal Current Observing System (Radar Component) CA STATE COASTAL CONSERVANCY VIA SCRIPPS INSTITUTION OF OCEANOGRAPHY		
	04-229	02/01/05 - 03/31/06	\$82,075
Moline, Mark	The Southern California Coastal Current Observing System (Transition Component) CA STATE COASTAL CONSERVANCY VIA SCRIPPS INSTITUTION OF OCEANOGRAPHY		
	04-230	02/01/05 - 03/31/06	\$113,914
Moline, Mark	A Coastal Ocean Circulation Monitoring Program for Northern and Central California CA STATE COASTAL CONSERVANCY VIA SAN FRANCISCO STATE UNIVERSITY		
	04-251	11/15/04 - 12/31/09	\$599,033
Moline, Mark	Equipment Purchase for the Coastal Ocean Circulation Monitoring Program for Northern and Central California CA STATE COASTAL CONSERVANCY VIA SAN FRANCISCO STATE UNIVERSITY		
	05-284	11/15/04 - 12/15/09	\$2,654,438
Moline, Mark	Littoral Sensors for Naval Special Forces U.S. DEPT OF THE NAVY, OFFICE OF NAVAL RESEARCH VIA CONTINENTAL CONTROLS AND DESIGN.		
	06-017	09/01/05 - 01/31/06	\$21,000
Moline, Mark	Bioluminescence Potential in the Transition Zone to Very Shallow Water U.S. DEPT OF THE NAVY, OFFICE OF NAVAL RESEARCH		
	06-019	10/01/05 - 03/30/10	\$159,425
Moline, Mark	Rapid Environmental Assessment Using an Integrated Coastal Ocean Observation and Modeling U.S. DEPT OF THE NAVY, OFFICE OF NAVAL RESEARCH VIA RUTGERS UNIVERSITY		
	06-089	08/01/06 - 04/30/09	\$222,837



## ATTACHEMENT 1

FACULTY PI CO-PI	TITLE SPONSOR AWARD #	PROJECT DATES	AMOUNT
<b>MARK MOLINE</b>			
Moline, Mark	SCCOOS: Shelf to Shoreline Observatory Development NOAA VIA SCRIPPS INSTITUTION OF OCEANOGRAPHY 06-114	07/01/06 - 06/30/07	\$59,400
Moline, Mark	An Underwater Bioluminescence Assessment Tool (UBAT) U.S. DEPT OF THE NAVY, OFFICE OF NAVAL RESEARCH VIA WET LABS, INC. 06-202	08/29/06 - 12/31/08	\$72,753
Moline, Mark	UUV Operations to Characterize Circulation and Morphology of Tidal Flats U.S. DEPT OF THE NAVY, OFFICE OF NAVAL RESEARCH (DRI) 07-205	03/01/07 - 12/31/07	\$28,997
Moline, Mark	Demonstration of Direct Measurement of Ocean Surface Currents NASA VIA JET PROPULSION LABORATORY 07-229	03/15/07 - 11/15/07	\$45,953
Moline, Mark	Lagrangian studies of the transport, transformation, and biological impact of nutrients and contaminant metals in an estuarine plume. NATIONAL SCIENCE FOUNDATION 07-251	07/01/07 - 02/28/09	\$48,400
Moline, Mark	Publication of Special Edition of "Limnology and Oceanography" NATIONAL SCIENCE FOUNDATION 07-279	07/01/07 - 12/31/08	\$80,000
Moline, Mark	Use of UUVs to Evaluate and Improve Model Performance within a Tidally-dominated Bay U.S. DEPT OF THE NAVY, OFFICE OF NAVAL RESEARCH 07-311	08/01/07 - 07/31/08	\$670,436
Moline, Mark	A High-Endurance Autonomous Underwater Vehicle for Observation Networks, Model Assimilation, and Prediction U.S. DEPT OF THE NAVY, OFFICE OF NAVAL RESEARCH (DURIP) 08-051	04/15/08 - 04/14/09	\$455,000
Moline, Mark	CeNCOOS: Long-Term Monitoring of Environmental Conditions in Support of Protected Marine Area Management in Central and Northern California NOAA VIA MONTEREY BAY AQUARIUM RESEARCH INSTITUTE 08-132	08/01/08 - 07/31/09	\$168,321
Moline, Mark	Southern California Coastal Ocean Observing System (SCCOOS): Shelf to Shoreline Observation Development NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION VIA SCRIPPS INSTITUTION OF OCEANOGRAPHY 08-137	07/01/09 - 06/30/10	\$95,692

## ATTACHEMENT 1

FACULTY PI CO-PI	TITLE SPONSOR AWARD #	PROJECT DATES	AMOUNT
<b>MARK MOLINE</b>			
Moline, Mark	Demonstration of Direct Measurement of Ocean Surface Currents NASA VIA JET PROPULSION LABORATORY		
Personnel:	Thomas Moylan	Ian Robbins	
	08-217	05/01/08 - 08/01/08	\$14,822
Moline, Mark	Dynamic Modeling of Marine Bioluminescence and Night Time Leaving Radiance U.S. DEPT OF THE NAVY, OFFICE OF NAVAL RESEARCH		
	09-075	01/21/09 - 12/31/11	\$76,146
Moline, Mark	Autonomous Underwater Vehicle Support for Ocean Modeling in Prince William Sound OIL SPILL RECOVERY INSTITUTE		
Personnel:	Ian Robbins		
	09-210	04/01/09 - 03/31/10	\$57,085
Moline, Mark	Variability of Near Surface Optical Properties in High Sea State Conditions OFFICE OF NAVAL RESEARCH VIA OREGON STATE UNIVERSITY		
	09-238	06/01/09 - 05/31/10	\$94,106
Moline, Mark	Shelf to shoreline observation development - Ocean surface current mapping (SCM) component CA STATE COASTAL CONSERVANCY VIA SCRIPPS INSTITUTION OF OCEANOGRAPHY		
Personnel:	Brian Zelenke		
	10-114	07/15/09 - 06/30/10	\$125,000
Wendt, Dean	Elucidating the Nexus of Science and Society in the Morro Bay Ecosystem DAVID AND LUCILE PACKARD FOUNDATION - ECOSYSTEM-BASED MANAGEMENT REGIONAL INITIATIVES		
Personnel:	Mark Moline	Royden Nakamura	Lars
	05-281	01/01/06 - 01/30/09	\$1,500,000
Wendt, Dean	Achieving Management and Conservation Goals through the Application of Ecosystems-based Management on the Central Coast of California DAVID AND LUCILE PACKARD FOUNDATION		
Personnel:	Mark Moline	Royden Nakamura	Lars John Stephens
	08-321	12/01/08 - 12/31/11	\$1,500,000
			<b><u>Moline Award Total: \$10,147,865</u></b>
<b>LOU ROSENBERG</b>			
Harris, Kathleen C. Ruef, Michael	Collaborative High Incidence Personnel Preparation (CHIPP) U.S. DEPT OF EDUCATION		
Personnel:	Co-PI: Ruef, Michael	Diana C. Rheinisch	Thomas Skelton
	05-236	08/01/05 - 07/31/10	Elaine Chin Leonard Davidman \$776,818
Rosenberg, Lou	Robotic Underwater Camera System CABRILLO MARINE AQUARIUM		
	07-131	11/01/06 - 06/30/07	\$5,000

## ATTACHEMENT 1

FACULTY PI CO-PI	TITLE SPONSOR AWARD #	PROJECT DATES	AMOUNT
<b>LOU ROSENBERG</b>			
Rosenberg, Lou	2008-09 Senior Project Exhibits for San Luis Obispo Children's Museum SAN LUIS OBISPO CHILDREN'S MUSEUM 09-148	09/01/08 - 06/30/10	\$13,940
			<b><u>Rosenberg Award Total: \$795,758</u></b>
<b>LARS TOMANEK</b>			
Tomanek, Lars	Analysis of the Ciona Intestinalis Stress Proteome with Differential Gel Electrophoresis (DIGE) CSUPERB: CSU FACULTY-STUDENT COLLABORATIVE RESEARCH SEED GRANT PROGRAM 07-090	06/01/07 - 05/31/08	\$13,500
Tomanek, Lars	Collaborative Research: Evolutionary and Ecological Physiology of Blue Mussels (genus Mytilus): Gene and Protein Expression and Molecular Evolution in Differently-adapted Congeners NATIONAL SCIENCE FOUNDATION 07-177	09/01/07 - 08/31/08	\$478,286
Tomanek, Lars	Research Opportunity Award: Evolutionary and Ecological Physiology of Blue Mussels (genus Mytilus): Gene and Protein Expression and Molecular Evolution in Differently-adapted Congeners NATIONAL SCIENCE FOUNDATION 08-131	01/01/08 - 08/31/08	\$0
Tomanek, Lars	Protein Expression Profiles as Biomarkers for Exposure to Persistent Organic Pollutants in Arrow Goby, Clevelandia ios CA SEA GRANT COLLEGE PROGRAM 08-247	03/01/08 - 02/28/09	\$28,777
			<b><u>Tomanek Award Total: \$520,563</u></b>
<b>DEAN WENDT</b>			
Wendt, Dean	Research & Development of Advanced Non-Toxic Coatings: Laboratory-Based Experiments Using Barnacles and Bryozoans U.S. DEPT OF THE NAVY, OFFICE OF NAVAL RESEARCH		
Personnel:	TBD Research Assistant		
	02-196	09/01/02 - 11/30/08	\$423,003
Wendt, Dean	Elucidating the Nexus of Science and Society in the Morro Bay Ecosystem DAVID AND LUCILE PACKARD FOUNDATION - ECOSYSTEM-BASED MANAGEMENT REGIONAL INITIATIVES 05-182	03/01/05 - 06/30/05	\$45,239
Wendt, Dean	Elucidating the Nexus of Science and Society in the Morro Bay Ecosystem DAVID AND LUCILE PACKARD FOUNDATION - ECOSYSTEM-BASED MANAGEMENT REGIONAL INITIATIVES		
Personnel:	Mark Moline Royden Nakamura Lars		
	05-281	01/01/06 - 01/30/09	\$1,500,000



## ATTACHEMENT 1

FACULTY PI CO-PI	TITLE SPONSOR AWARD #	PROJECT DATES	AMOUNT
<b>DEAN WENDT</b>			
Wendt, Dean	Field Testing of Emergent Marine Coatings for the Center for Nanoscale Science and Engineering at North Dakota State University U.S. DEPT OF THE NAVY, OFFICE OF NAVAL RESEARCH 06-018	09/01/05 - 10/31/06	\$40,000
Wendt, Dean	Collaborative Research on the Marine Resources of San Luis Obispo County RESOURCES LEGACY FUND FOUNDATION Personnel: Royden Francis X. John Stephens Nakamura Villablanca	11/03/05 - 12/31/08	\$498,331
Wendt, Dean	Elucidating the Nexus of Science and Society in the Morro Bay Ecosystem RESOURCES LEGACY FUND FOUNDATION 06-160	01/01/06 - 12/31/08	\$400,000
Wendt, Dean	Elucidating the Nexus of Science and Society in the Morro Bay Ecosystem DAVID AND LUCILE PACKARD FOUNDATION - ECOSYSTEM-BASED MANAGEMENT REGIONAL INITIATIVES 06-175	07/01/05 - 06/30/07	\$10,381
Wendt, Dean	Elucidating the Nexus of Science and Society in the Morro Bay Ecosystem CA STATE COASTAL CONSERVANCY 06-176	08/01/06 - 06/30/10	\$500,000
Wendt, Dean	Elucidating the Nexus of Science and Society in the Morro Bay Ecosystem: Water Quality and Nutrient Dynamics in the Morro Bay Estuary MORRO BAY NATIONAL ESTUARY PROGRAM 06-243	06/01/06 - 10/30/06	\$105,000
Wendt, Dean	Collaborative Surveys of Nearshore Fishes In and Near Central California MPA's CA SEA GRANT PROGRAM 07-109	06/01/07 - 12/31/08	\$101,751
Wendt, Dean	Field and Laboratory Testing of Emergent Marine Coatings for the Center for Nanoscale Science and Engineering at North Dakota State University U.S. DEPT OF THE NAVY, OFFICE OF NAVAL RESEARCH 07-120	12/12/06 - 06/30/08	\$42,000
Wendt, Dean	A Collaborative Protocol for Monitoring Marine Protected Areas with Commercial Fisherman RESOURCES LEGACY FUND FOUNDATION 08-211	04/01/08 - 01/31/10	\$302,423
Wendt, Dean	Task 1: First 10 Test Panels JANSSEN PHARMACEUTICA NV - PRESERVATION AND MATERIAL PROTECTION 08-232	03/01/08 - 03/26/10	\$10,000

## ATTACHEMENT 1

FACULTY PI CO-PI	TITLE SPONSOR AWARD #	PROJECT DATES	AMOUNT
<b>DEAN WENDT</b>			
Wendt, Dean	A Collaborative Protocol for Monitoring Marine Protected Areas with Commercial Fishermen CAMPBELL FOUNDATION 08-277	06/01/08 - 05/31/09	\$25,000
Wendt, Dean	Achieving Management and Conservation Goals through the Application of Ecosystems-based Management on the Central Coast of California DAVID AND LUCILE PACKARD FOUNDATION		
Personnel:	Mark Moline Royden Nakamura Lars Tomanek John Stephens		
	08-321	12/01/08 - 12/31/11	\$1,500,000
Wendt, Dean	Biological Assessment of the Efficacy of Non-toxic, Fouling Release Coatings and Investigations of the Mechanisms Controlling Elastomeric Coating Performance U.S. DEPT OF THE NAVY, OFFICE OF NAVAL RESEARCH 09-109	01/01/09 - 12/31/11	\$318,014
Wendt, Dean	Field Testing of Emergent Marine Coatings for the Center for Nanoscale Science and Engineering at North Dakota State University NORTH DAKOTA STATE UNIVERSITY 09-195	03/20/09 - 01/31/10	\$40,000
Wendt, Dean	Achieving Management and Conservation Goals through the Application of Ecosystems-based Management on the Central Coast of California RESOURCES LEGACY FUND FOUNDATION 09-199	01/01/09 - 12/31/11	\$400,000
Wendt, Dean	Field testing of emergent marine coatings for the Center for Nanoscale Science and Engineering at North Dakota State University NORTH DAKOTA STATE UNIVERSITY 10-157	12/21/09 - 12/31/10	\$36,000
<b><u>Wendt Award Total: \$6,297,142</u></b>			
<b><u>Report Total: \$18,474,550</u></b>			

## ATTACHEMENT 2

**Grants Development Office**  
**California Polytechnic State University, San Luis Obispo**  
<http://www.calpoly.edu/~grants>  
**Grant and Contract Activity from 1/1/05 to 3/3/10 for Packaging Group Pls**

PI CO-PI	SPONSOR AWARD #	FACULTY TITLE	PROJECT DATES	AMOUNT
<b>JAGJIT SINGH</b>				
Singh, Jagjit	Fee-for-Service Agreement, Cal Pack Lab VARIOUS SPONSORS 04-120		- 06/30/09	\$15,989
Singh, Jagjit	Development of Commercially Viable Recycled Polyethylene Terephthalate CA DEPT OF CONSERVATION 08-021		01/01/08 - 12/31/09	\$500,000
				<b><u>Singh Award Total: \$515,989</u></b>
<b>KEITH VORST</b>				
Vorst, Keith Singh, Jagjit	Predictive Growth Models for Escherichia coli O157:H7 on Fresh-Cut Produce During Transport and Cold Chain Distribution U.S. DEPT OF AGRICULTURE (CSREES) - NIFSI Co-PI: Singh, Jagjit 09-252	J Wyatt Brown	09/01/09 - 08/31/12	\$596,029
Vorst, Keith	Development of a bio-based and biodegradable polylactic acid spray coating and hot melt adhesive for corrugate and paperboard packages HENKEL - INDUSTRIAL ADHESIVES AND LBP MANUFACTURING 10-113	Philip Costanzo Chad E. Immoos Bruce Robertson Jeffrey Hess	01/01/10 - 12/31/10	\$159,059
				<b><u>Vorst Award Total: \$755,088</u></b>
				<b><u>Report Total: \$1,271,077</u></b>